

The listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. **(Currently Amended)** A data storage device for use with a beam transmitter configured to transmit a beam, comprising:

a luminescent layer comprising a luminescent material capable of emitting light while being bombarded by the beam from the beam transmitter;

a detector located near the luminescent layer for detecting the light emitted from the luminescent layer; and

a phase-change layer located between the luminescent layer and the detector, said phase-change layer able to transform from a first phase to a second phase;

the first phase of the phase-change layer enables transmission of material more light through the phase-change layer from the luminescent layer to the detector than the second phase of the phase-change layer wherein light emitted from the luminescent layer and received by the detector materially differs in opacity when the phase-change layer transforms from the first phase to the second phase.

2. **(Cancel)** The device of claim 1, wherein the first phase of the phase-change layer enables transmission of materially more light through the phase-change layer from the luminescent layer to the detector than the second phase of the phase-change layer.

3. **(Previously Amended)** The device of claim 1, wherein the first phase of the phase-change layer represents an unwritten region of the phase-change layer and the second phase of the phase-change layer represents a written region of the phase-change layer.

4. **(Previously Amended)** The device of claim 1, wherein the first phase of the phase-change layer represents a written region of the phase-change layer and the second phase of the phase-change layer represents an unwritten region of the phase-change layer.

5. **(Original)** The device of claim 1, wherein the beam comprises a low power

density photon beam lacking sufficient power to cause the phase-change layer to change from the first phase to the second phase.

6. **(Original)** The device of claim 1, wherein the beam comprises a low power density electron beam lacking sufficient power to cause the phase-change layer to change from the first phase to the second phase.

7. **(Original)** The device of claim 1, wherein the luminescent layer comprises a material having a high thermal conductivity.

8. **(Original)** The device of claim 1, wherein the luminescent layer comprises a material having a low thermal conductivity.

9. **(Original)** The device of claim 1, wherein the luminescent layer and the phase-change layer are adjacent and share an interface.

10. **(Original)** The device of claim 9, wherein the interface has a radiative recombination rate and a non-radiative recombination rate that each depend on whether the neighboring region of the phase-change layer is in the first phase or the second phase.

11. **(Original)** The device of claim 1, wherein the luminescent layer comprises at least one of a YAG-based material, a rare earth element dopant, a YAP-based material, GaN, Zn oxide, Zn sulfide, and Si.<sub>3</sub>O<sub>4</sub>.

12. **(Original)** The device of claim 1, wherein the luminescent layer comprises an optically neutral medium and optically active nanoparticles in the optically neutral medium.

13. **(Previously Amended)** A data storage device for use with a beam transmitter configured to transmit a beam, comprising:

a luminescent layer comprising a luminescent material capable of emitting light while being bombarded by the beam from the beam transmitter;

a phase-change layer located between the luminescent layer and the beam transmitter, said phase-change layer able to transform from a first phase to a second phase; and

a detector located proximate the luminescent layer for detecting the light emitted from the luminescent layer;

wherein light emitted from the luminescent layer and received by the detector materially differs when the phase-change layer transforms opacity from the first phase to the second phase.

14. **(Original)** The device of claim 13, wherein the first phase of the phase-change layer enables transmission of materially more light from the luminescent layer to the detector than the second phase of the phase-change layer.

15. **(Original)** The device of claim 14, wherein the first phase of the phase-change layer represents an unwritten region of the phase-change layer and the second phase of the phase-change layer represents a written region of the phase-change layer.

16. **(Original)** The device of claim 14, wherein the first phase of the phase-change layer represents a written region of the phase-change layer and the second phase of the phase-change layer represents an unwritten region of the phase-change layer.

17. **(Original)** The device of claim 13, wherein the beam comprises a low power density beam lacking sufficient power to cause the phase-change layer to change from the first phase to the second phase.

18. **(Original)** The device of claim 13, wherein the luminescent layer comprises at least one of a YAG-based material, a rare earth element dopant, a YAP-based material, GaN, Zn oxide, Zn sulfide, and Si.<sub>3</sub>O<sub>4</sub>.

19. **(Original)** The A device for use with a beam transmitter configured to transmit a beam, comprising:

a luminescent layer comprising a luminescent material capable of emitting light while being bombarded by the beam from the beam transmitter;

a detector located near the luminescent layer and the beam transmitter for detecting the light emitted from the luminescent layer; and

a phase-change layer located adjacent the luminescent layer such that the luminescent layer is positioned between the detector and the phase-change layer, said phase-change layer able to transform from a first phase to a second phase;

wherein light emitted from the luminescent layer and received by the detector materially differs when the phase-change layer transforms from the first phase to the second phase.

20. **(Original)** The device of claim 19; wherein the first phase of the phase-change layer enables transmission of materially more light from the luminescent layer to the detector than the second phase of the phase-change layer.

21. **(Original)** The device of claim 20, wherein the first phase of the phase-change layer represents an unwritten region of the phase-change layer and the second phase of the phase-change layer represents a written region of the phase-change layer.

22. **(Original)** The device of claim 20, wherein the first phase of the phase-change layer represents a written region of the phase-change layer and the second phase of the phase-change layer represents an unwritten region of the phase-change layer.

23. **(Original)** The device of claim 19, wherein the beam comprises a low power density beam lacking sufficient power to cause the phase-change layer to change from the first phase to the second phase.

24. **(Original)** The device of claim 19, wherein the luminescent layer comprises at least one of a YAG-based material, a rare earth element dopant, a YAP-based material, GaN, Zn oxide, Zn sulfide, and Si<sub>3</sub>N<sub>4</sub>.

25. **(Original)** The device of claim 19, further comprising an anti-reflective coating located proximate the phase-change layer.

26. **(Original)** The device of claim 19, further comprising a thermal diffusion layer located proximate the phase-change layer.

27. **(Original)** The device of claim 19, further comprising a reflective layer proximate the phase-change layer.
28. **(Original)** The device of claim 19, wherein the phase-change layer comprises a plurality of layers of phase-change material.
29. **(Original)** The device of claim 19, wherein the luminescent layer comprises a plurality of layers of luminescent material.
30. **(Original)** The device of claim 1, further comprising an anti-reflective coating located proximate the phase-change layer.
31. **(Original)** The device of claim 1, further comprising a thermal diffusion layer located proximate the phase-change layer.
32. **(Original)** The device of claim 1, further comprising a reflective layer proximate the phase-change layer.
33. **(Original)** The device of claim 1, wherein the phase-change layer comprises a plurality of layers of phase-change material.
34. **(Original)** The device of claim 1, wherein the luminescent layer comprises a plurality of layers of luminescent material.
35. **(Original)** The device of claim 13, further comprising an anti-reflective coating located proximate the phase-change layer.
36. **(Original)** The device of claim 13, further comprising a thermal diffusion layer located proximate the phase-change layer.
37. **(Original)** The device of claim 13, further comprising a reflective layer proximate the phase-change layer.
38. **(Original)** The device of claim 13, wherein the phase-change layer comprises

a plurality of layers of phase-change material.

39. **(Original)** The device of claim 13, wherein the luminescent layer comprises a plurality of layers of luminescent material.

40. **(Previously Amended)** A method for storing data on a data storage device comprising a phase change layer and a luminescent layer, the method comprising:

bombarding the luminescent layer with a beam, causing the luminescent layer to emit light;

detecting the light emitted from the luminescent layer using a detector; and

writing data by transforming the phase change layer from a first phase to a second phase; wherein light emitted from the luminescent layer and detected by the detector materially differs when the phase-change layer transforms opacity from the first phase to the second phase.